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FACTORS OF IMPORTANCE IN PEA APHID CONTROL^{1/}

By J. E. Dudley, Jr., U.S.D.A., Agr. Res. Adm., Bureau
of Entomology and Plant Quarantine, Madison, Wisconsin

Watch for early infestation by the pea aphid. The key to the probable time and degree of early aphid infestation in peas is often found in the condition of the alfalfa and clover crops in May. Therefore, examine alfalfa and clover fields during May (for southern and central Wisconsin) by making sweeps with an insect net having an opening 12 inches in diameter. Each sweep should cover half a circle. Check on several fields in each locality and several places in each field, because in 1948 the infestation in early May ranged from no aphids up to as many as 500 per sweep in different alfalfa fields. By the time winged forms are present in alfalfa, the chances are that movement of winged aphids to peas is under way.

Begin to watch pea fields late in May. Frequently in a bad aphid year, such as 1948, peas only 2 to 3 inches high become heavily infested. The presence of winged aphids with colonies of young on peas indicates that movement is taking place. Their early presence, although not a positive indication that the season's aphid infestation will be heavy and damaging, is a warning. Therefore, equipment and availability of insecticides should be checked. Assignment of personnel and contacts with custom control operators should be arranged. Being aware of an early infestation, being ready to control it, and getting an early start are three of the most important steps in successful aphid control.

The weekly bulletin of the Wisconsin Cannery Association will probably provide information upon the general aphid infestation in the state. Additional information on aphid conditions may be obtained through entomologists at the University. Neither of these sources, however, can give you a picture of the conditions in individual fields or in any given area. Only a survey by net collections every 2 or 3 days by competent field men can give a true picture of the situation.

Start treatment early. Control operations should be commenced when there are on an average of 50 aphids per sweep. There are several reasons why such a procedure is important:

(1) If the sweep net shows 50 aphids per sweep, there may have been up to 100 present in the half-circle covered by the net, for as a rule it does not collect much more than half the aphids present.

(2) A heavy infestation of aphids will damage young plants more quickly and more seriously than it will older plants.

(3) With favorable weather conditions, aphids will reproduce rapidly on young pea vines. If the original infestation is controlled, and if there is not a constant movement of winged aphids into the peas, the aphid population should not build up enough to require another treatment for a week or 10 days, and usually not for the rest of the season. Good control of relatively few aphids leaves far fewer to continue reproduction than the same control of a large number of aphids.

(4) An early start provides an early opportunity to find out whether the equipment is in proper repair and whether application is satisfactory or faulty.

(5) If the infestation is destined to become severe, an early start will hold the amount of damage to a minimum.

^{1/} In cooperation with the Wisconsin Agricultural Experiment Station.

Employ good equipment. Even though all other conditions for dusting are favorable, good control of the aphid will not be obtained with equipment that is antiquated or in poor condition. The dust must be discharged with considerable force in order to penetrate the foliage and hit as many aphids as possible. Therefore, all parts of the duster should be kept in good working order and free from caked accumulations. The duster boom should not be so long, in relation to engine horsepower and fan capacity, that the dust will only spill out instead of being discharged with force. In general power dusters, whether powered by a separate engine or by a power take-off from a tractor, are more efficient than are horse-drawn traction dusters partly because they cover a wider swath and partly because they can be driven at a uniform speed and still have the rate of application adjusted.

Do a careful, thorough job. Although time is a recognized factor in aphid control on a large acreage, haste may make waste.

(1) Applying insecticides when the wind velocity is more than 3 or 4 miles per hour is a waste of time and material if no apron is used. For instance, in an 8-mile-per-hour wind and without an apron, at least half of the dust may be blown away from the peas and result in an insufficient quantity reaching the aphids. For satisfactory coverage of vines and aphids the wind velocity should not be more than 12 miles per hour even with a 50-foot apron.

(2) Driving the apparatus through a field at too high a speed decreases the degree of aphid control. A speed of 3 to 4 miles per hour is recommended.

(3) Unless the air is calm and the vines are wet, much better aphid control will result by having the duster boom enclosed in front and at the ends with canvas to which an apron is attached. The longer the apron, the better the control. However, it should be short enough to allow turning at the end of a field without its folding over and remaining so. Aprons 40 to 50 feet long usually follow along well at the turns. For example, at a speed of 4 miles per hour and with a 40-foot apron, the dust would be confined and would circulate under the apron for approximately 7 seconds. Short aprons, 8 to 10 or 12 feet long, do not allow the dust cloud to flow around and through the pea foliage. In a wind, they may act as a flue, with the result that more dust is blown away than if no apron were used. The apron should always be weighted to hold it down close to the peas. Four ropes 1/2 to 3/4 inch in diameter and the length of the apron, one attached on each side and two equally spaced from the middle, are the best and most easily handled means of weighting the apron. Bamboo poles or iron rods are not so good as ropes and make the folding and transporting of the apron more difficult.

(4) The recommended rate of application of a dust is predicated upon the quantity which should remain on the aphids, vines, and ground after the machine has passed. If too little is discharged from the duster boom, or if wind blows much of it away, the aphid kill is decreased proportionally. Although 35 pounds of dust mixture per acre is usually recommended, satisfactory control can frequently be obtained on vines 4 to 6 inches high in calm weather with less than 35 pounds, whereas a somewhat larger quantity may be desirable with tall, heavy vine growth or if dusting has to be done while the wind is blowing at 10 miles or more per hour.

Check results accurately. Results of treatments, especially the early ones, should be carefully checked in order to ascertain the percentage of control obtained. If the control does not appear to be adequate in a day or two after treatment, a study should be made of the conditions throughout and after treatment. One or several factors may be involved, such as weather conditions, an insecticide of low potency, faulty application, or constant influx of winged aphids. As to weather conditions, wind or rain during application or continued low temperatures or heavy rain after application is made might reduce control. The toxic ingredient of the

dust mixture may be insufficient to provide satisfactory kill. For the strengths of insecticides to use, check on the recommendations made by the Experiment Station entomologists. If it appears that the application has been faulty, the duster should be carefully checked as to speed of engine, condition of gears or belt, and especially the condition of hopper, tubes, and nozzles to see that all are clear of caked material. Rate of travel, wind velocity, and the type of apron used should also be checked. When winged aphids are daily reinfesting pea fields, one application is not likely to be so effective as when their movement is of short duration. However, the continued arrival of winged forms serves as a warning that all pea fields must be constantly watched for a build-up of aphid populations and that control measures must be again applied.

Do not apply insecticides when rain is imminent. Do not dust when it is raining or when rain is expected in a few hours. Some of the newer synthetic insecticides kill aphids quickly, sometimes effecting a 90 percent reduction in two hours, but their effectiveness will be considerably decreased if rain falls too soon after application. From what we know at present, it is safe to apply dusts (except nicotine and tetraethyl pyrophosphate) when the peas are slightly wet from dew or rain. Some insecticides are more effective when applied to slightly wet foliage. However, a long apron cannot be used on wet foliage, so if the vines are wet the wind velocity should not be more than 3 or 4 miles per hour.

Use caution when treating after pods have formed. The question of applying insecticides by ground machinery after the peas are in pod has many phases, and canners should weigh them all before deciding whether to treat or not. Perhaps the greatest danger lies in the effect upon the quality of peas after the machinery has run over the pods. The peas in pods that have been slightly injured several days before harvest may be affected in color, flavor, or texture by the time they are ready to be canned. On the other hand, a rapidly increasing aphid infestation on partly filled pods is likely to reduce markedly the yield of shelled peas; misshapen and punctured pods do not shell out in the viner, but go over the viner apron or through the viner to the stack.

Probably it would be worth while to treat infested peas in early pod, but it is doubtful whether peas should be treated by ground machinery 3 or 4 days before harvest.

Treat again if necessary. If the first application has not provided satisfactory control and if the aphids are again rapidly increasing, treat the fields again and try to do a more thorough job than was done the first time. If you have already spent \$4 or \$5 per acre for one application of insecticides, it would appear logical to spend a like sum for a second application in an effort to save the crop.

Experimental results over a period of many years have shown that a single, thorough, timely application of a good insecticide is usually sufficient to control the aphid for the season. Therefore, by following the advice and cautions just given you, it should be possible for you to achieve good pea aphid control in most years with a single application of insecticide.

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